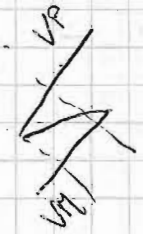
PROVA 17 MARZO 2008



1)

a) Oscillatore a ponte di Wien.
Uscita su V+, più pulita perché all'uscita del follower.

b) – netlist –

$f = \frac{1}{2\pi}\frac{1}{RC}$ freq. osc. Wien

$T = 2\pi RC = 10 \cdot 10^{-6} = 10\,\mu s$

.TRAN 10 n 50.02 m 50 m 1 n

d) $R_B = 2R_A$ (non dovrebbe essere $R_B > 2R_A$? Ma così Spice non converge).

e) Filtro:

$$H(s) = \frac{sRC}{s^2R^2C^2 + 3sRC + 1}$$

$$H(f_0) = \frac{j2\pi f_0 RC}{-4\pi^2 f_0^2 R^2C^2 + 3j2\pi f_0 RC + 1}$$

$$H(\omega_0) = \frac{j\omega_0 RC}{-\omega_0^2 R^2C^2 + 3j\omega_0 RC + 1}$$

$\omega_0 = \frac{1}{RC} \Rightarrow H(\omega_0) = \frac{j}{-1 + 3j + 1} \Rightarrow$

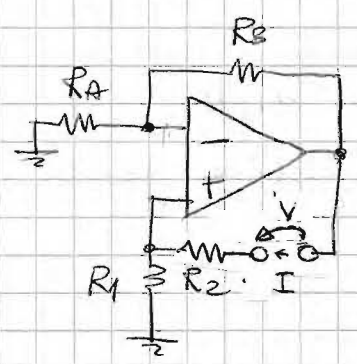
$|H(\omega_0)| = \frac{1}{3}$ $\quad K(\chi_1)\,H(\omega_0) = 1$

$K(\chi_1) = 3$

$$K(x_1) = \frac{V_1}{x_1} = \frac{1}{x_1}\left(1+\frac{R_B}{R_A}\right)x_1 = 3$$

Questa non è una risposta sufficiente per il punto 1.e)
Risposta giusta ???

2)



a) SAT+ : $V = I(R_1+R_2) - V_{UM}$, $I = \dfrac{V+V_{UM}}{R_1+R_2}$

SAT− : $V = I(R_1+R_2) + V_{UM}$, $I = \dfrac{V-V_{UM}}{R_1+R_2}$

b) HG! $V = I(R_1+R_2) - \left(\left(1+\frac{R_B}{R_A}\right)V^+\right) =$

$= I(R_1+R_2) - \left(\left(1+\frac{R_B}{R_A}\right)(R_1 I)\right) =$

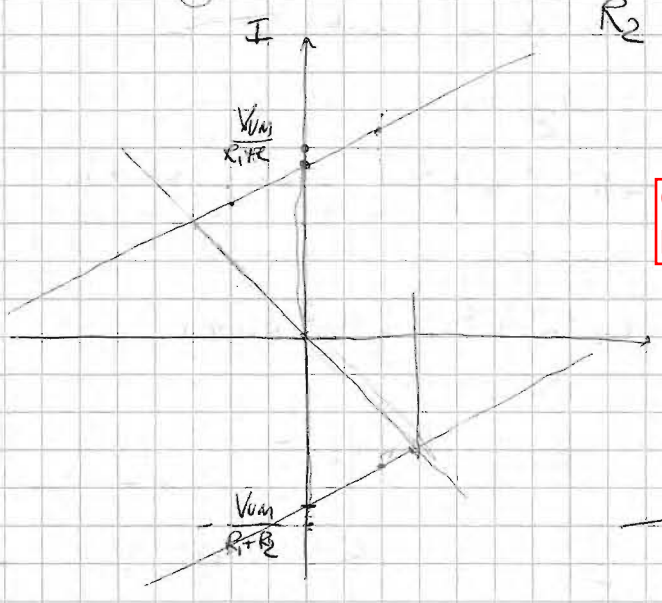
$= I\left(R_1+R_2 - R_1 - \frac{R_B}{R_A}R_1\right) =$

$= I\left(R_2 - \frac{R_B}{R_A}R_1\right) \Rightarrow$

$$I = \frac{V}{R_2 - \frac{R_B}{R_A}R_1} \Rightarrow R_2 - \frac{R_B}{R_A}R_1 < 0 \Rightarrow$$

$$R_2 < \frac{R_B}{R_A}R_1 = 2k$$

$$R_2 < 2k$$



Cambiando R2 cambia la pendenza del tratto in HG.